Note: Seeking help from EE/CENG students may be counterproductive for this assignment as they are likely to try to use the methods you will learn in Chapter 3 instead of just KCL, KVL, Ohm’s Law and the passive sign convention. This assignment is meant to have you focus just on these basics so that Chapter 3 material will be easier.

**Problem 1**

Using the passive sign convention, mark the polarity of the current source and the direction of current flow through the voltage source and resistors.

**Problem 2**

Using Ohm’s Law, find the current through $R_3$ and the voltage drop across $R_2$. Make sure to use the correct units and indicate the direction of current flow through $R_3$ and polarity of the voltage across $R_2$.

**Problem 3**

Using KCL, find values for $I_S$ and $i_{R1}$ given that $i_{R3} = 20\text{mA}$, $i_{R2} = 20\text{mA}$. A complete solution will include KCL equations.
**Problem 4**

Using KVL, find values for $V_{I_s}$ and $V_{R1}$ given that $V_{R2} = 10 \, \text{V}$ and $V_{R3} = 20 \, \text{V}$. A complete solution will include KVL equations.

\[ +V_{R2} -V_{R1} + +R_1 R_3 +V_{R3} - IS +V_{I_s} - \]

**Problem 5**

Using KCL, KVL and Ohm’s Law, find the current through each resistor, the voltage across each resistor and the voltage across the current source. A complete solution will include KCL, KVL equations. Make sure to indicate polarity and direction of flow.

\[ +R_2 -R_1 +R_3 +IS +V_{I_s} - \]

**Given:**
- $R_1 = 500 \, \Omega$
- $R_2 = 500 \, \Omega$
- $R_3 = 1000 \, \Omega$
- $I_s = 40 \, \text{mA}$

**Problem 6**

Using KVL, find values for $v_1$, $v_2$, and $v_3$ given that $v_4 = 20 \, \text{V}$, $v_5 = 25 \, \text{V}$, $v_6 = 10 \, \text{V}$, and $v_7 = 15 \, \text{V}$. A complete solution will include KVL equations.

\[ +v_7 -v_5 +v_6 -v_2 +v_4 -v_3 +v_1 +v_3 + \]


Problem 7
Using KVL, find \(v_1, v_2, v_3\) and \(v_4\) given that \(v_5 = 12\) V, \(v_6 = 6\) V, \(v_7 = -8\) V, and \(v_8 = 10\) V. A complete solution will include KVL equations. What does a negative voltage indicate?

Problem 8
Using KCL find \(i_1, i_2,\) and \(i_3\) given that \(i_4 = -10\) A, \(i_5 = 7\) A, \(i_6 = 3\) A. A complete solution will include KCL equations. What does a negative value indicate?

Problem 9
Write the KCL equation for the supernode shown in the figure below. Using the values for the currents found in Problem 8, show that KCL is valid for the supernode.
Problem 10
Suppose that the cost of electrical energy is $0.15 per kilowatt hour and that the power delivered is constant. Your bill for 31 days is $80.

Find: The power in watts delivered and the current if supply voltage is 120 V.